I Claim:

1. A vaccine for preventing gram negative infections and the effects of endotoxins which comprises a complex obtained by combining LPS free or in conjugate form with a stoichiometric excess of a peptide of the formula:

(a) $(A)_n$ wherein A is Lysine or Arginine and n is an integer with a minimum value of 7;

(b) $(AB)_m$ wherein A is Lysine or Arginine and B is a hydrophobic amino acid selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; m is an integer with a minimum value of 3; and

(c) $(ABC)_p$ wherein A is a cationic amino acid which is Lysine or Arginine; B and C are hydrophobic amino acids which may be the same or different and are selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; p is an integer with a minimum value of 2.

sub a'

2. A vaccine as defined in claim 1 wherein the peptide is a linear or cyclic peptides having units of the formula:

(a) $(A)_n$ wherein A is Lysine or Arginine and n is an integer with a value of 7 to 16;

(b) $(AB)_m$ wherein A is Lysine or Arginine and B is a hydrophobic amino acid selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; m is an integer with a value of 4 to 20; and

(c) $(ABC)_p$ wherein A is a cationic amino acid which is Lysine or Arginine; B and C are hydrophobic amino acids which may be the same or different and are selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; p is an integer with a value of 4 to 20.

3. A vaccine as defined in claim 1 wherein the LPS is

derived from N. menigitidis.

4. A vaccine as defined in claim 1 wherein the LPS is derived from Salmonella typhi.

5. A vaccine as defined in claim 1 where the amount of peptide is from 2-10 to 2-5000 times the weight of the LPS.

6. A vaccine as defined in claim 1 wherein the peptide has units of the formula $(AB)_m$.

7 A vaccine as defined in claim 1 wherein the peptide has units of the formula $(ABC)_p$.

8. A vaccine as defined in claim 1 wherein the peptide is of the formula:
$(Lys)_{10}$. (SEQ ID NO: 1)

9. A vaccine as defined in claim 1 wherein the peptide is of the formula:
$(Lys\text{-}Glu)_5$. (SEQ ID NO: 4)

10. A vaccine as defined in claim 1 wherein the peptide is of the formula:
$(Lys\text{-}Phe)_5$. (SEQ ID NO: 5)

11. A vaccine as defined in claim 1 wherein the peptide is of the formula:
Lys-Phe-Leu-Lys-Lys-Thr-Leu. (SEQ ID NO: 6)

12. A vaccine as defined in claim 1 wherein the peptide is of the formula:
$(Lys\text{-}Phe\text{-}Leu)_2$-Lys. (SEQ ID NO: 7)

13. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Lys\text{-}Phe\text{-}Leu)_3\text{-}Lys$. (SEQ ID NO: 8)

14. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Arg\text{-}Tyr\text{-}Val)_3$. (SEQ ID NO: 9)

15. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Lys\text{-}Phe\text{-}Phe)_3\text{-}Lys$. (Seq ID NO: 10)

16. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Lys\text{-}Leu\text{-}Leu)_3$ (SEQ ID NO: 11)

17. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Lys)_6(Phe\text{-}Lys)_2$. (SEQ ID NO: 12)

18. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-$(Lys)_5$-Cys
s----------s. (SEQ ID NO: 13)

19. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-Lys-Phe-Lys-Lys-Cys
s--------------------s. (SEQ ID NO: 14)

20. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Phe-Lys-Cys-Lys-Phe-Lys-Phe-Lys-Cys
s----------s. (SEQ ID NO: 15)

21. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Leu-Lys-Cys-Lys-Leu-Lys-Leu-Lys-Cys
s----------s. (SEQ ID NO: 16)

22. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Arg-Thr-Arg-Cys-Arg-Phe-Lys-Arg-Arg-Cys
s----------s. (SEQ ID NO: 17)

23. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Cys-$(Lys-Phe-Lys)_2$-Cys-Lys
s----------s. (SEQ ID NO: 18)

24. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-$(Lys)_4$-$(Phe)_4$-Cys
s----------s. (SEQ ID NO: 19)

25. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-$(Lys-Phe-Leu)_3$-Lys-Cys
s----------s. (SEQ ID NO: 20)

26. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Val-Lys-Ala-Leu-Arg-Val-Arg-Arg-Leu (SEQ ID NO: 21)

27. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Ser-Leu-Ser-Leu-Lys-Arg-Leu-Thr-Tyr-Arg (SEQ ID NO:22)

28. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Val-Arg-Lys-Ser-Phe-Phe-Lys-Val (SEQ ID NO: 23)

29. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Phe-Leu-Lys-Pro-Gly-Lys-Val-Lys-Val (SEQ ID NO: 24)

30. A vaccine as defined in claim 1 wherein the peptide is

of the formula:
Lys-Asp-Leu-Lys-Arg-Ile-Lys-Ile (SEQ ID NO: 25)

31. A vaccine as defined in claim 1 wherein the peptide is of the formula:
Lys-Trp-Lys-Ala-Gln-Lys-Arg-Phe-Leu (SEQ ID NO: 26)

32. A vaccine as defined in claim 1 wherein the peptide is of the formula:
Lys-Trp-Lys-Ala-Gln-Lys-Arg-Phe-Leu-Lys (SEQ ID NO: 27)

33. A vaccine as defined in claim 1 wherein the peptide is of the formula:
Lys-Arg-Leu-Lys-Trp-Lys-Tyr-Lys-Gly-Lys-Phe (SEQ ID NO:28)

34. A vaccine as defined in claim 1 wherein the peptide is of the formula:
Cys-Gln-Trp-Lys-Ser-Ser-Asp-Ile-Arg-Cys-Gly-Lys
s----------s (SEQ ID NO: 29)

35. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-Lys-Phe-Leu-Lys-Lys-Cys
s----------s (Seq ID NO: 30)

36. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Thr-Lys-Cys-Lys-Phe-Leu-Lys-Lys-Cys(SEQ ID NO:31)
s - - - - - - - - - s

37. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Phe-Leu-Lys-Lys-Thr(SEQ ID NO: 32)

38. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-Lys-Lys-Leu-Phe-Lys-Cys-Lys-Thr-Lys
s - - - - - - - - - - - - s(SEQ ID NO: 33)

39. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-Lys-Lys-Leu-Phe-Lys-Cys-Lys-Thr
s - - - - - - - - - - - - s(SEQ ID NO: 34)

40. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Ile-Lys-Thr-Lys-Cys-Lys-Phe-Leu-Lys-Lys-Cys
s - - - - - - - - - - - - s(SEQ ID NO: 35)

41. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Ile-Lys-Thr-Lys-Lys-Phe-Leu-Lys-Lys-Thr(SEQ ID NO: 36)

42. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Ile-Lys-Phe-Leu-Lys-Phe-Leu-Lys-Phe-Leu-Lys(SEQ ID NO: 37)

43. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Phe-Leu-Lys-Phe-Leu-Lys(SEQ ID NO: 38)

44. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Arg-Tyr-Val-Arg-Tyr-Val-Arg-Tyr-Val(SEQ ID NO: 39)

45. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Phe-Phe-Lys-Phe-Phe-Lys-Phe-Cys(SEQ ID NO: 40)

46. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Ile-Lys-Phe-Leu-Lys-Phe-Leu-Lys-Phe-Leu(SEQ ID NO:41)

47. A vaccine as defined in claim 1 wherein the peptide is of the formula:

$(Lys)_6$Phe-Leu-Phe-Leu(SEQ ID NO:42)

48. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Cys-Lys-Phe-Lys-Phe-Lys-Phe-Lys-Phe-Cys
s----------s(SEQ ID NO: 43

49. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Trp-Lys-Ala-Gln-Lys-Arg-Phe-Leu-Lys(SEQ ID NO: 44)

50. A vaccine as defined in claim 1 wherein the peptide is of the formula:

Lys-Arg-Leu-Lys-Trp-Lys-Tyr-Lys-Gly-Lys-Phe(SEQ ID NO: 45)

51. A method for the preparation of a vaccine for prevention of gram-negative infections and the effects of endotoxins, said method comprising combining LPS with a stoichiometric excess of a peptide of the formula:

(a) $(A)_n$ wherein A is Lysine or Arginine and n is an integer with a minimum value of 7;

(b) $(AB)_m$ wherein A is Lysine or Arginine and B is a hydrophobic amino acid selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; m is an integer with a minimum value of 3; and

(c) $(ABC)_p$ wherein A is a cationic amino acid which is Lysine or Arginine; B and C are hydrophobic amino acids which may be the same or different and are selected from the group consisting of Valine, Leucine, Isoleucine, Tyrosine, Phenylalanine and Tryptophan; p is an integer with a minimum value of 2.

52. A vaccine as defined in claim 1 which is combined or administered with other vaccine components.

53. A vaccine as defined in claim 1 which contains an LPS peptide complex derived from more than one species of bacteria.

add a6

Add B11

Add D7